

WHAT IS CLAIMED IS:

1           1.       A spacerless or geocomposite double bottom apparatus for a storage tank having a  
2 metal bottom and upwardly extending metal sidewalls, which apparatus comprises:  
3               a first lining layer of flexible plastic on top of said metal bottom;  
4               a plastic grid having a plurality of openings therethrough on top of said first lining  
5 layer;  
6               at least one layer of fiber insulation on top of said grid; and  
7               an upper metal bottom on top of said fiber material welded to said sidewalls.

1           2.       A double bottom apparatus as set forth in Claim 1 wherein said first lining layer is  
2 a high density polyethylene sheet.

1           3.       A double bottom apparatus as set forth in Claim 1 wherein said plastic grid is  
2 composed of high density polyethylene.

1           4.       A double bottom apparatus as set forth in Claim 1 wherein said fiber insulation is  
2 mechanically bonded mineral or glass wool.

1           5.       A double bottom apparatus as set forth in Claim 4 including two layers of said  
2 mechanically bonded mineral or glass wool.

1           6.     A double bottom apparatus as set forth in Claim 1 wherein said upper bottom extends  
2     through slots in said sidewalls and is welded thereto by welding to a flat bar extending from said  
3     sidewalls.

1           7.     A double bottom apparatus as set forth in Claim 6 wherein all welds are made from  
2     above said upper bottom.

1           8.     A double bottom apparatus as set forth in Claim 1 including a leak detection port  
2     through said sidewalls between said original bottom and said upper bottom.

1           9.     A double bottom apparatus as set forth in Claim 7 wherein said leak detection port  
2     includes a clear cylindrical tube so that fluid therein is visible.

1           10.    A double bottom apparatus as set forth in Claim 1 wherein a fluid tight containment  
2     space is created between said upper bottom, said sidewalls, and said first lining layer.

1           11.    A double bottom apparatus as set forth in Claim 10 wherein said fluid tight  
2     containment space is purged of oxygen.

1           12.    A double bottom apparatus as set forth in Claim 11 wherein said lining layer is  
2     fastened to said metal bottom by a plurality of fasteners.

1           13.    A double bottom apparatus for a storage tank as set forth in Claim 1 including a  
2    sealant between said first lining and said sidewalls.

1           14.    A method of installing a spacerless double bottom for a storage tank having a metal  
2    bottom and upwardly extending sidewalls, which method comprises the steps of:

3                   installing a first lining layer of flexible plastic on top of said metal bottom;

4                   installing a plastic grid having a plurality of openings therethrough on top of said  
5    lining layer;

6                   installing at least one layer of fiber insulation on top of said grid; and

7                   installing a new upper metal bottom above said natural fiber material.

1           15.    A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2    including the additional step of affixing said lining layer to said metal bottom.

1           16.    A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2    wherein said step of installing at least one layer of fiber insulation includes installing two layers of  
3    said fiber insulation.

1           17.    A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2    wherein said step of installing a new upper metal bottom includes the steps of cutting a plurality of  
3    openings through said sidewalls, inserting a plurality of flat plates in said tank and through said  
4    sidewalls, and welding said flat plates to said sidewalls.

1           18.     A method of installing a spacerless double bottom apparatus as set forth in Claim 17  
2     wherein all welding is performed from above said flat plates.

1           19.     A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2     wherein said flat plates are welded to flat bars previously welded and extending from said sidewalls.

1           20.     A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2     wherein said lining layer, said sidewalls and said upper bottom form a fluid-tight secondary container  
3     and including the additional step of purging said container of oxygen.

1           21.     A method of installing a spacerless double bottom apparatus as set forth in Claim 14  
2     including the additional step of installing a leak detection port through said sidewalls.